

# SOME SOLUTIONS TO ADAPT TO THE NATURAL CONDITIONS IN THE TRADITIONAL HOUSES OF PEOPLE IN THE MEKONG DELTA, VIETNAM

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## ABSTRACT

*Today, air pollution, climate change and the need for a sustainable environment have motivated people to approach the concept of "sustainable development". Traditional Vietnamese architecture is a process of adapting, reconciling with nature, giving a lot of experience in creating residence space, coping with the natural environment. And today, some of the issues remain relevant to our age so that we can learn and promote them.*

*The Mekong Delta in Việt Nam is a land where habitats spread across the river so residents must always find ways to adapt to the difficulties and exploit the advantages of nature as to create living space and ecological environment. Through the article, we want to mention the values and experiences drawn from the process of studying dealing with nature in traditional architecture to find ways of application in the present.*

**KEYWORDS:** Sustainable Behavior, Nature, Traditional Architecture & Ecological Environment

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## 1. INTRODUCTION

Viet Nam is a country located in a tropical climate region, with diversity in topography, climate and natural environment. The country has a river culture of the delta regions including delta culture and marine culture; each region has its own characteristics of natural, cultural and social environment, of which the water area most prominent is that of the Mekong Delta.

The living environment spreads across waterways, so the people here have to find ways to adapt to the difficulties, exploit the advantages of nature in creating their own residential space and ecological environment. By the practical experience accumulated and handed down from many generations and efforts of the people here to have a peaceful, beautiful and sustainable living space, that lessons and experience are also the issues we like to further explain.

## 2 OVERVIEW OF PEOPLE AND CHARACTERISTICS OF NATURAL CONDITIONS

### 2.1 Some Details on History of Formation and Development

The history of river civilization in the Mekong Delta begins very early, from the first millennium BC. Under the influence of Indian civilization, in the 6 first centuries BC, the inhabitants of this land created the brilliant Phu Nam civilization, which used to be a gathering place for many groups of Southeast Asian people, especially the South Island inhabitants, who are masters in the process of conquering the water surface. Such river civilization in the South Viet Nam reached its peak during the Oc Eo - Phu Nam time (I-VII century AD) - where the river civilization began, making a generation of open and gentle people, dynamic, daring to think and act, respecting honor, loving nature and waterways.

The civilization of the Mekong Delta is the expansion to a new height of the river civilization, being formed and nurtured from the cradle of the Red River Delta, passing across the civilizations of Van Lang - Au Lac, and Thang Long - Dai Viet. That is one of the sources flowing from the past to the present, creating a part of Vietnamese cultural identity, uniting the whole community.

The Mekong Delta is a relatively new region, undergoing quite diverse changes in the process of fourth-and-backward sea movement, depressed lands which a typical landscape of river ecological region.

Nature in the Southwest land is pleasant due to the favorable climate for vegetation growth - especially in the past, there was a floating rice seed called *celestial rice* because farmers did not need to sow it- the grains as full-grown falling into the soil, firmly nested under thick mud during sunny times ready to germinate in the coming rainy season. Rice grows along with each flood season, they are blossom, grow firm, full of grains ready for the harvest. Houses on stilts are built on high ground next to country paths and canals, so that during flood seasons, forest animals could gather underneath for survival.

Therefore, depending on the terrain and ecological environment conditions, different appropriate types of housing create a diversity of residence typical to this region.

## 2.2 Characteristics of Natural Conditions

As naturally, overall the Southern region consists of two sub-regions: the Southeast area and the Mekong Delta, early formed and developed by the Mekong river system largest waterway in Southeast Asia. The alluvial deposits then formed an evenly flat terrain, just above sea level, with many empty mud-covered deep lands, over-flooded in rainy season.

This is a typical tropical climate region, with little change in the high temperature, an average of 26-27 degrees (Celsius) with two distinct seasons: dry and rainy seasons. Heavy rain, almost without storms, rivers, canals, people formed, developed along rivers and canals.



Figure 1: Map of Mekong Delta (source: [14]).

Due to the interaction of natural elements of rivers, canals, sea and land, it creates ecological diversity for this land. In the plain, there are mountains, seas, pristine mangrove forests, freshwater alluvial areas, etc., fertile land, which gives people many opportunities to do business, explore and develop.

### **2.2.1 Topography**

In general, the height can be divided into three levels: the grade with the height of more than 3m is located along Hau river, Tien River, along hilly areas and residential land areas, canal banks.

The level with the height of 1.5m is located in the area between Hau and Tien rivers, and lower than 1.5m in the left bank of Tien and right bank of Hau river. Therefore, the terrain has three main types:

- Dunes (islet) in the middle of the high and lower sides.
- The form of a basin with the terrain of two higher rivers, gradually lower into the middle of the field.
- The delta is the alluvial land, which is higher than the interior area.

### **2.2.2 Characteristics of Rain and Flood**

In the rainy season from May to November every year, rainfall ranges from 1250mm to 1550mm, accounting for 5-8% of the total amount of water, contributing to flooding the low-lying areas of the delta. Around September, October coincides with peaks of the Mekong.

Although located in the delta, the flood pressure is quite strong, so in the rainy season, the Mekong River bed is not enough to carry the rushing water.

And, when the floods of Tien and Hau floods cause inundation of the whole Mekong Delta, it floods the inland areas; devastate crops, infrastructure as well as the ecological environment. Dry season causes pests and diseases, creating a unsustainable and unstable state for the lives of the people here [5].

## **2.3 Some Characteristics of People, Culture and Beliefs**

Like other regions as of cultural and spiritual activities, Vietnamese people along with Chinese and Cham people who came to settle here have explored and adapted to the natural conditions and scenery here. , undergoing adaptation of nature, forming a place where they are liberal, frank, sociable, adaptable to the living environment, accepting of religious beliefs, in harmony with all backgrounds, ethnic groups, showing through diverse architecture, adapted to climatic conditions and local style [9].

Residents have a high uniformity of ideology, consciousness influenced by the ideas of Buddhism, Confucianism, Taoism and a few Catholics,

This is also the foundation for village culture. Spiritual roles also create confidence in the universe, respect for feng shui principles in building residence space. The combination of the above factors is shown in the ceremonies, taboos, invocation of the gods, reverence for ancestors, grandparents... preserving respect, cultivating personality and morals.

These details, in addition to the positive side, also have limitations, including less attention, less investment in housing construction. With positive and negative aspects in the personality, making a difference, typical cultural nuances of the Southern people in the common personality system of the Vietnamese people

## **3. TYPE OF RESIDENCE**

### **3.1. Forms of Typical Residence**

The Southern region is a newly formed region of traditional architecture and houses with influences and improvements from houses in the North and the Central. Residential land in the Southern region calls for land farm

and planting soil. Dien is a rice field land with two types of Son Dien (high mountain land) and Thao Dien (arable land, low land with grass).

Even though it is a field land, there are still some people living along the field;

### 3.1.2 Planting Soil

A soil used for growing crops and gardening. Terracotta is the land used to build houses, or residential land. Depending on the type of land, there are different types of housing architecture, divided according to the structure of the house: stilt houses, half-ground houses, half-floor houses, floating houses on rivers, etc. along canals, associated with natural topography and geomorphology.

Directions to build houses from East, Southeast and South, if facing roads or roads along rivers and canals, do not choose direction. House architecture includes many large and small houses, semi-permanent houses; ground layout is simple including yard, vegetable garden, fruit trees, animal sheds, auxiliary spaces, sanitation.

Large, fertile land, easy to cultivate until the land becomes infertile, people easily leave to find a new better land, partly because of the psychology of not living too long in a land. And, natural conditions are less disaster, so the construction of houses does not need solid or fancy care as traditional houses in North and Central Vietnam.

## 3.2 Traditional Architectural forms of Housing

The forms of residence associated with the terrain and the natural environment include two main types of residence:

### 3.2.1 Settlement

Type of house that adheres to a specific terrain type of ground-floor houses, stilt houses and floating houses on the river.

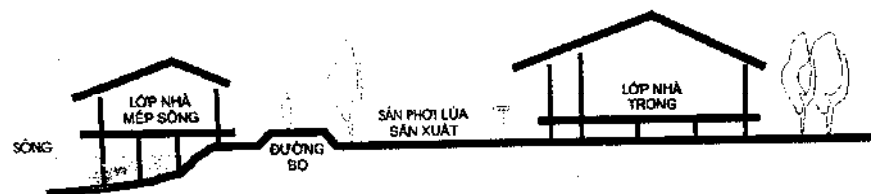


Figure 2: Pattern of Dual habitat (source [12]).

### 3.2.2 Lưỡng cư: Dual Habitat

Types of houses with part sticking to the ground, part of the floor reaching out to the river surface like in Cao Lanh, Thap Muoi. including: the first layer on the edge of the river, half lying on the banks, half reaching the river, the outer layer of houses crossing the river to go and operate on the surface of the river.

The traditional types of houses in the Mekong Delta are mainly the dinh houses, *houses*, *house Chũ Đình*, *house Xếp đội*, *house Bát dền*, *house Thảo bặt*.

These types of houses are initially made of wooden columns, or bricks protruding from the ground or water surface, which is a suitable choice for the river terrain. Those houses are as follows

#### 3.2.2.1 House Chũ Đình

The annex is located next to the main house.

### 3.2.2.2 House Xếp đội

Layers of houses connected in depth to form many layers of kinked roofs, interconnected roofs, main room for receiving guests and when there are family events, backyard is the place for family activities, room for children, kitchen with rice grainery combined with separate back door to enter the kitchen.

### 3.2.2.3 House Bát dần

The main house is developed in a style with 1-2 roofs on either side

### 3.2.2.4 House Thảo bặt ven sông

Auxiliary house adjoining main house, two living roofs connected in parallel by gutters.

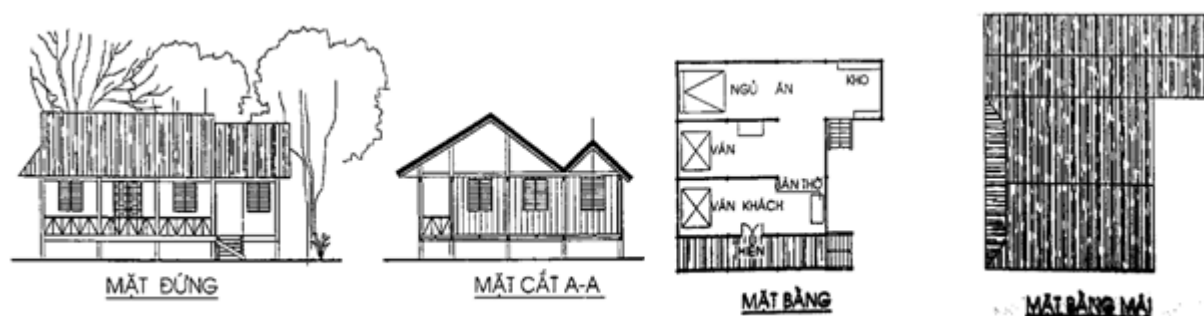


Figure 3: Pattern of House “Thảo bặt” by the river, Mekong Delta [12].

The flooded areas have houses on reinforced stilts going deeply into the mud. Houses that leaned on the ground looked like trees with pillars like roots going deeply into the ground.

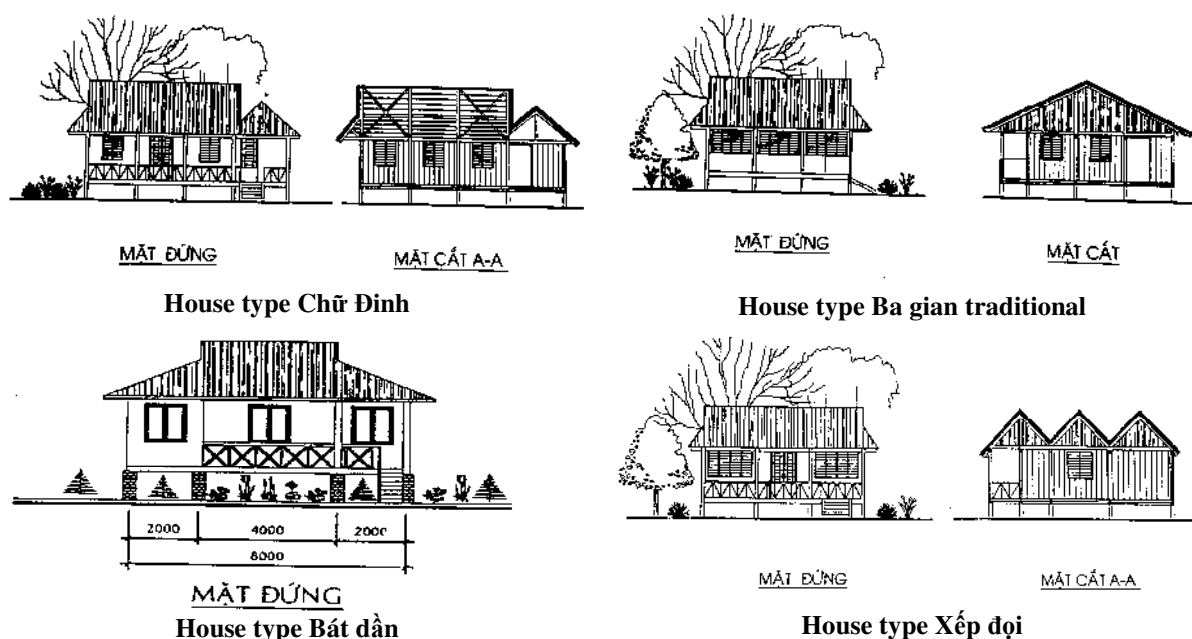


Figure 4: Some Mekong Delta Traditional Houses: Houses on Stilts Adapted to River Regions [12].

The simple frame structure does not have much solidity, and the roof has a steep slope to drain quickly. Building materials mainly from wood and bamboo, cajuput, mangrove, nipa palm leaves, or soil mixed with straw), ceramic tiles ...





In the cultivated land, there is a pond lying at the front or side of the house, the auxiliary production area has storage of rice, firewood, agricultural tools ... usually arranged near the kitchen and auxiliary houses. Restroom is isolated at the back, made of casual materials. Around and inside the garden area, there are dykes and ditch systems to prevent floods as well as to drain flooding water for protection of houses and gardens. Land area and housing size are often large, depending on the economic conditions of each family, not restricted by the rules and regulations of social standards as in other regions.

Plan of architecture in the house of Mme Nguyễn Thị Thu Hương, Bình Ninh, Bình Phan, sub - province Chợ Gạo, province Tiền Giang

source: [14]



**Figure 6: The House has 7 Rows of Pillars, Front of Shutters and Ventilated Blue Wooden Wall [13].**

As such, the harmonious natural conditions in the South are less affected by climate or cold weather, harsh hot and sunny summers like the North and the Central. Housing therefore, shows quite simple and easy on the form of architecture, different from the very serious and devoting a lot of enthusiasm, effort and investment in the houses of the Northern and Central residents.

## 4. WAYS OF COPING WITH NATURAL ELEMENTS IN THE RESIDENCE SPACE

### 4.1 Selecting Land to Build Houses and Gardens

Due to the characteristics of low terrain and multi-crossing river system, residents reside along the waterway routes along the river banks or canals, along the inter-provincial, inter-commune transport routes. The location of the house is selected the is in the order of priority such as “Nhất cận thị, nhị cận tân, tam cận giang, tứ cận lộ, ngũ cận điền”, literally meaning "first nearby the market, second nearby the port, third nearby waterway, fourth nearby road, fifth nearby adjacent fields" (market - boat - river - road - garden and fields), forming residential clusters as well as traditional residential spaces.

People have to find ways to adapt and improve the land so they can build houses garden and grow crops. *Farming* in the South is water-wet rice cultivation/crop and gardening. People make ditches continuously, digging rows of small ditches in parallel to allow water to flow together. The soil from the ditch is used to put on the side making rectangular beds running along the length of the land.



**Figure 7: Coconut Trees for Draining and Preventing Flooding Water in Sub-Province Chợ Gạo, Province Tiền Giang [13].**

In houses built partly on stilts and partly on-the-ground, it is arranged so that the front and the back separate each other for people from muddy land not to come in straight at the front and for preparation of field activities, family events, daily activities at the back, in contact with ground - will be easy to move, this is why the type of house - house Xếp đội or house Thảo bặt - should have the back protrudes, being wider than the front and the door looks to the front.

#### **4.2 Choice and Adaptation for Life by River**

The delta is subjected to a complex hydrological system, with intertwined with waterways, flooding waters from the main streams combined with rainwater causing worse floods, which means a permanent danger for people living alongside the rivers.

The water surface brings livelihood resources, both peaceful and excessive (floods). That is a strong impact factor, which dominates so much in life, production, transportation, circulation ... and house-building - creating floating villages on the water surface.

The life of fishing on the river is in clusters of floating houses, rafts surrounding the pond area, fish ponds, creating fishing towns, fishing villages. There are houses on stilts pitch deeply into the canals, and all sorts of stilts houses, and houses on-the-ground in the plains, and houses with partly stilts partly on-the-ground at the riversides. The communication is by boat, monkey bridges in the flooded areas. So, the traffic connection such as the river junction or both sides of bridges becomes the places, where markets and community activities gather.

##### **4.2.1 Water Element**

Besides the benefits of nature, people also cope with difficult challenges, typically the fourth-and-back excessive floods as millions of volumes of water from the Mekong River upper stream flushing down, causing inundation and landslides. In order to preserve soil, prevent soil erosion, protect houses and gardens, people must grow layers of plantation and plants covering from riverbed to shore, with natural trees - as: Mangrove and Melaleuca trees - having strong, water-resistant roots system along the banks of rivers and canals.



**Figure 8: Preserving Soil, Preventing Soil Erosion from Riverbed to Shore by Plants Having Strong, Water-Resistant Roots System [13].**



#### **4.2.2 Climate Adaptation: Sun and Wind**

##### **Sun**

This South area has plenty of sunshine over the year (2000 - 2600 hours / year). Choose a house facing the South to receive cool breeze, not facing the West to avoid the slanting sultry sun heat. The front opens on wide doors, using the leaves foliage to ease direct sunshine, arranging climbing vegetation frames as with gourds, cucurbits... creating natural sunshades to protect people and cattle from hot sun heat, glowing glare and reflections from bright-colored walls of the house.

It is remarkable that the roof framework of the traditional house occupies a large proportion - yin-yang tiles and slates or palm leaf, nipa, straw roofing ... providing a good insulation against the hardship of nature. Such advantages help deal with heavy rainfall, sun heat. The body of the house includes details of surrounding walls, louvers, verandas, and porch panels, then with bonsai, water basins ... to regulate the climate, increase beauty for the house.

Thus, by the characteristics of waterways, and sunshine, it is an advantage to get natural sun energy by creating grooves at the middle of the roof to receive natural lighting.

At the top of surrounding walls under the roof are panels of ventilation to create air streams as well as reduce the light glare at the entrance. At the front, a large yard is arranged for drying rice paddy and other daily activities. At the back, there is a garden used for making economic revenues and avoiding hot weather.

As such, traditional housing architecture in the Mekong Delta is much simpler than that of Northern and Central regions. There have been architectural solutions convenient for tropical climate of rivers regions - as the form of verandas, walls, doors, sunshades ... Those are valuable experiences handed over from one generation to the next.



**Figure 9: The Spacious Yard for Drying Rice Paddy, Driving Sunlight to the Entrance, Arranging Trees Shades at the Gate, Avoiding Sun Heat, of a Traditional House in Chợ Gạo and Đông Hòa Hiệp, province Tiền Giang.**

##### **Wind**

The front of the house eventually looks out to the South, Southeast, Southwest, and East or depending on the terrain to benefit from the cool breeze. The back is convenient for daily activities, as many doors are made with carvings, the walls, often low-leveled, having windows with panes or wide porch covering on top. Those windows are left open all day long, the cool air stream taking away the heat and humidity so keeping the indoor always dries.

Coping with such characteristics of rivers regions and regular flood waters, people find out solutions to drive the cool breeze indoors and create ventilation inside out to prevent moisture –because of high humidity, the houses then becoming dry faster during the flood season. Therefore, people demonstrate a flexible, very proactive, simple and highly effective selection method, as they are looking for solutions to overcome difficulties of climate conditions.



**Figure 10: Wooden Fence Surrounding the Front of the House, Top of Wall with Opening and Decorative Light-up Patterns at the Old House of Mr. Trần Tuấn Kiệt, built in 1838, Phú Hòa, Đông Hòa Hiệp, province Tiền Giang.**

#### 4.3 Economic Development, and Creation of Perennial Fruit Gardens and Orchards

The Mekong River Delta, with land areas and farm fields, has a much larger area than that of the North and Central regions. Owners could explore freely and be recognized by the feudal government during the Nguyen Dynasty giving land area unrestricted, forming large-scale orchards to form specialized cultivation, high economic efficiency. Such conditions became an important economic sector to nourish population here - this is a typical feature of *miệt vườn* - literally meaning gardens and orchards - of the Southern regions.



**Figure 11: Range of Trees at the Front, Bonsai in Front Yard, Backyard Plantations of Orange, Tangerine, Pomelo at Old House of Mr. Phan Văn Đức, An Lợi, Đông Hòa Hiệp, Province Tiền Giang [13].**

The entrance by the side of the house usually has trees as emphasis marks. The adjacent plants at the sides create shades; the backyard grows gourds and cucurbits, around the banks of a pond. Around the court yard, plantations show quite freely in style and many types of trees, creating shade as well as a provision of vegetables, fruits ; besides, there are plantations of industrial crops with export value such as pepper, cocoa, cashew ..., giving the residents such permanent economic benefits, proving the people's ability to make the most of the natural resources.

## 5. CONCLUSIONS

With a clear awareness of the laws of nature and climate, people are dynamic and creative, selecting their father's experiences to deal with the natural environment on their housing - their residence space. From the characteristics of

natural conditions and climate in the Mekong Delta, they have chosen ways of adaptation: mainly they make the most of the generous benefits of nature in a submissive manner based on harmony, in agreement with nature course, not by active prevention or forceful intervention upon nature. People take the pattern "living with floods" to build floating houses, house *Lưỡng cư*, house *Đon cư*, according to the topography of rivers and canals; they choose the direction for the house; they organize reasonable functional terrain, sunshade, wind shield, flood and humid rain prevention; they use local materials, natural origin... Therefore they could create sustainability and stability for living space and agreement with the environment.

These responses and adaptations to nature are unique cultural features of the monsoon tropical climate and river environment with specific nuances. Such behaviors show flexible living style, convenient practices of nature friendliness, profiting without destroying nature, relying on nature to survive and develop. Those differences in customs, habits, living style and residence are influenced by the natural environment, forming specific cultural nuances and architecture of the Mekong Delta, all of which flows into the cultural and architectural line of Việt Nam.

Therefore a valuable lesson, of full recognition, needs to be learned as legacy to benefit the people, and the living environment nowadays. Actually, because natural disasters regularly happen and ecological environment being exhausted, people are looking for sustainable ecological values over all areas of life to build living spaces. In the modern times of modern culture, we have should remember that sustainability must be the basis for full development and growth.

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## AUTHOR PROFILE



**Vo Thi Thu Thuy**, Current working as main lecturer in Department of Interior Architecture at Ho Chi Minh City University of Architecture.

### Educational process

University from 1984 to 1990 – Bachelor of Arts, Major: Interior decoration, Industrial Fine Arts University – Hanoi

University from 1993 to 1997 –Bachelor of foreign languages, Major: English, Hanoi University of Foreign Languages.

Post graduate from 2003 to 2007 – Master of Arts, Major: reasoning & History of Fine Arts, Ho Chi Minh City University of Fine Arts

Post graduate from 2008 to 2014 – Cultural Studies, Major: Applied Culture, University of Social Sciences and Humanities.

### University Teaching and Graduation Guidelines

Candidates for teaching subjects:

- Theory: basic disciplines of the Principles of Interior Design.
- Topic: Interior themes; Architectural culture; Urban Fine Arts Organization (SDH - Department of Urban Studies, University of Social Sciences and Humanities).
  - Guidance on interior and exterior design projects: project blueprints: Housing; Education projects; Transport works; Commercial and service works; Cultural works; Service works, ...
- More than 18 years of lecturer of university system of Architecture University and Hong Bang, Van Lang Universities, Saigon Technology, Ton Duc Thang, Hutech, Da Nang Architecture, Social Sciences and



Humanities ...

- Average teaching 800 lessons / year; guide graduation projects about 40 students / year. There are 2 students who won the Loa Thanh prize.
- Instruct students to carry out scientific research at the school level to achieve a consolation prize.
  - Over 10 years, my candidates have regularly participated in art drawing training courses, interior design classes of the Career Center (Ho Chi Minh City University of Architecture) for non-community learners.
  - Participating in the seminar "Urban Fine Arts Organization" for Graduate Students of Urban Studies at University of Social Sciences and Humanities.
  - Guiding 5 master theses in the fields of Culture, Urban Studies, Theory and art history, up to now, 3 students have protected.
  - Participating in the council and criticizing graduate thesis of universities. Culture, University of Social Sciences and Humanities and University. Fine art HCMC.



